

A NEW SPECIES OF *EIMERIA* (APICOMPLEXA: EIMERIIDAE) FROM THE STICK-NEST RAT, *LEPORILLUS CONDITOR* (RODENTIA: MURIDAE)

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Summary

O'CALLAGHAN, M. G. & O'DONOGHUE, P. J. (1999) A new species of *Eimeria* (Apicomplexa: Eimeriidae) from the stick-nest rat, *Leporillus conditor* (Rodentia: Muridae). *Trans. R. Soc. S. Aust.* (1999) 123(4), 133-135, 30 November, 1999.

A new species of *Eimeria* is described from five of eight (62.5%) stick-nest rats, *Leporillus conditor* from South Australia. Sporulated oocysts of *Eimeria leporilli* sp. nov. are ovoidal to sub-spheroidal, 19.3 x 15.7 µm, with a double oocyst wall, no micropyle, no oocyst residuum, with four ellipsoidal sporocysts 9.4 x 6.2 µm, slightly pointed at one end with a knob-like Steida body, each containing two sporozoites. Attempts to infect laboratory rats, *Rattus norvegicus*, with sporulated oocysts from stick-nest rats were unsuccessful.

KEY WORDS: Coccidia, *Eimeria*, *Eimeria leporilli* sp. nov., Rodentia, Muridae, *Leporillus conditor*, stick-nest rat, Australia.

Introduction

Enteric coccidia have not previously been reported in the stick-nest rat, *Leporillus conditor* (Sturt, 1858). Indeed, all previous records of eimeriid coccidia in rodents from Australia have been restricted to *Rattus norvegicus*, *R. rattus* and *Mus musculus* (cf. Mackerras 1958). A novel *Eimeria* sp. was discovered in *L. conditor* and is described here as new. The validity and host specificity of the *Eimeria* sp. was examined by attempted cross-transmission to *Rattus norvegicus*.

Materials and Methods

Faecal samples were collected from eight stick-nest rats from Franklin Island, South Australia from 1988 to 1997. Two samples were collected from animals which were subsequently transferred from the wild population on Franklin Island to a captive colony at the Monarto Fauna Facility, South Australia. Faecal samples were stored at room temperature for three weeks in 2% (w/v) aqueous potassium dichromate to allow oocysts to sporulate. Sub-samples were mixed in saturated sucrose solution (S.G. 1.33) and oocysts recovered by centrifugal flotation. Oocysts were examined microscopically using an oil immersion 100x

objective with a Nomarski differential interference contrast system and were measured using an eyepiece graticule calibrated with an Olympus objective micrometer. Measurements in the text are given in micrometres (µm), mean ± standard deviation with range in parentheses.

A phototype of the sporulated oocyst has been deposited in the US National Museum, Beltsville, Maryland, Parasite Collection (USNPC No. 88842).

Cross-transmission study

Two two month old laboratory-reared coccidia-free outbred Sprague-Dawley rats, *Rattus norvegicus* Berkenhout 1769, were obtained from the Institute of Medical and Veterinary Science, Adelaide. Animals were housed in a plastic cage with pre-sterilized bedding and accessed water and sterilized commercial rodent pellets *ad libitum*. Both were exposed to natural light/dark and temperature patterns (av. min. 17° C, av. max. 21° C) and isolated from other rodents. One rat was inoculated with 5,000 and the other with 10,000 sporulated oocysts harvested from three stick-nest rats by centrifugal flotation in saturated sucrose solution, washed three times in tap water, counted in a haemocytometer and given orally using a syringe fitted with plastic tubing. These oocysts were harvested from faecal samples collected in July, 1997 and were stored at room temperature in 2% (w/v) aqueous potassium dichromate for less than 82 days. Faecal samples were collected before inoculation to ensure the inoculated animals were not passing oocysts. Following inoculation, faecal samples were collected daily and examined for oocysts for 24 days.

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Results

Coccidial oocysts were detected in faeces from five of eight (62.5%) stick-nest rats examined. The morphological configuration of the oocysts conformed to those of the genus *Eimeria* in that they contained four sporocysts per oocyst and two sporozoites per sporocyst. The coccidial species detected was considered new on the basis of morphological characteristics, novel host species and apparent host specificity as infections could not be established in *R. norvegicus*.

Eimeria leporilli sp. nov.
(FIGS 1-3)

Material examined

Oocysts in faeces from 5 *Leporillus conditor*, 4 originating from Franklin Island, SA, (32° 27' S, 133° 40' E), 2, vi. 1988, 21, vi. 1988, 27, vi. 1988, 14, vii. 1997, and 1 from captive animals transferred from Franklin Island to Monarto, SA (35° 07' S, 139° 09' E), 27, vii. 1997. USNPC No. 88842.

Description

Oocysts ovoidal or subspheroidal, 19.3 ± 2.3 (14 - 25) \times 15.7 ± 1.6 (11.5 - 19) ($n = 100$); mean length:width ratio 1.2; oocyst wall bi-layered, outer layer colourless, smooth, 1.0 thick; inner layer colourless, 0.6 thick; micropyle and oocyst residuum absent; predominantly 1, but up to 5 refractile polar granules present; 4 ellipsoidal sporocysts 9.4 ± 1.25 (7.3 - 13) \times 6.2 ± 0.71 (4.2 - 8.2) ($n = 100$); slightly pointed at one end with a

conspicuous knob-like Steida body; sub-Steida body absent; 2 sporozoites filling sporocyst; large refractile globule 2.4 - 3.2 in diameter at posterior end; ellipsoidal sporocyst residuum, 2.4 in diameter at equator of sporocyst, composed as an aggregation of numerous granules.

Type host

Leporillus conditor (Sturt, 1848) Stick-nest rat.

Locality

Franklin Island, SA (32° 27' S, 133° 40' E).

Location in host

Oocysts in faeces; endogenous stages unknown.

Etymology

Specific name derived from the generic name of the host.

Cross-transmission study

Over the 24 day observation period, coccidia were not recovered from the faeces of two *R. norvegicus* inoculated with sporulated oocysts from stick-nest rats.

Discussion

Coccidia of the genus *Eimeria* are typically host specific; it is rare for these parasites to infect more than one host and many species are known only by the morphology of the oocysts and by the identity of the host in which they are found (Joyner 1982). Upton *et al.* (1992) suggested that some rodent

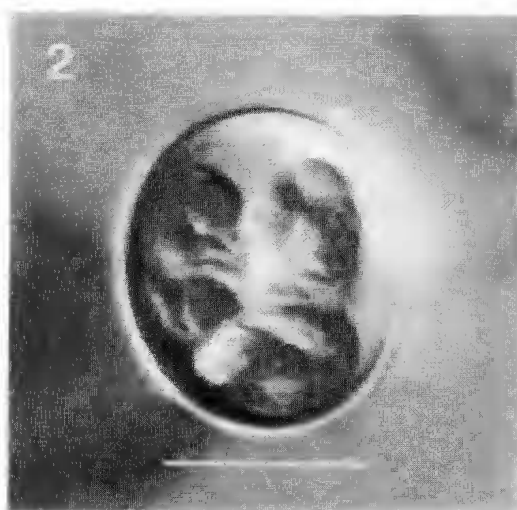


Fig. 1. *Eimeria leporilli* sp. nov. from captive stick-nest rat - sporulated oocyst. Scale bar = 10 μ m.

Fig. 2. *E. leporilli* sp. nov. from stick-nest rat on Franklin Island - sporulated oocyst. Scale bar = 10 μ m.

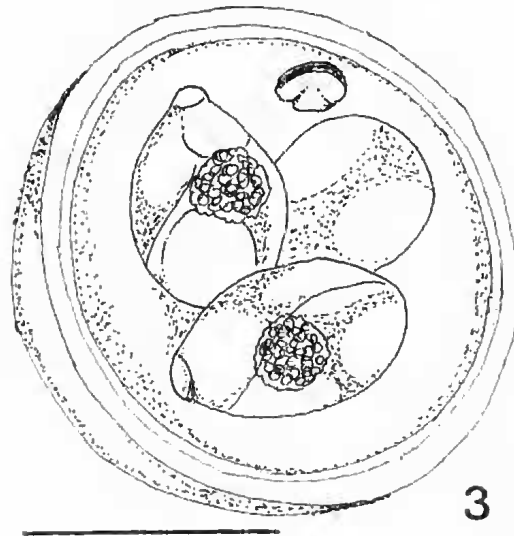


Fig. 3. Composite line drawing of sporulated oocyst of *E. leporilli*. Scale bar = 10 μ m.

coccidia are less specific in their host range and may be able to infect different, usually phylogenetically related, species. In this study, the *Eimeria* sp. detected in stick-nest rats did not establish an infection in experimentally inoculated *R. norvegicus*. The inability to infect *R. norvegicus* confirms the distinctness from coccidia previously reported in rodents in Australia (Mackerras 1958). However, the host range of coccidian species from native rodents remains to be determined by further comprehensive coprological and cross transmission studies. In addition, histological studies on gut sections are required to determine the endogenous developmental cycles and to indicate the potential pathogenicity of infections.

Eimeria leporilli sp. nov. exhibited variation in oocyst and sporocyst size, up to 40% and 43% respectively in each animal. Considerable variation in oocyst and sporocyst size is known to occur for many *Eimeria* species, some varying as much as 40% (Duszynski 1971). In the absence of other distinguishing characteristics, the coccidia described here are considered to be a single species with considerable size variation in the oocyst and sporocyst.

Acknowledgment

We thank S. Conaghty for providing samples from the captive animals.

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